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LCP Update Guide

Section 8. Coastal Hazards

Managing development to respond to coastal hazards is a key component of a local coastal program. The Coastal Act policies direct new development to reduce risks to life and property and avoid substantial changes to natural landforms. Coastal Act section 30253 provides, in part, that new development shall do all of the following:

- (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.
- (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

The responses to coastal hazards in an LUP should provide for solutions that have the least impacts on coastal resources.

In updating your LCP, keep in mind that one of the primary approaches to minimizing hazards is to avoid locating new development in hazardous areas, wherever feasible. The LUP can achieve this through subdivision, siting and design standards. Also remember that your LCP can address hazards concerns by requiring that safety and stability to be assured for the life of a development. If it is not feasible to minimize risks through avoidance of a hazard, you can require avoidance to be maximized and development to be designed, through features such as elevation, to protect against the consequences of unavoidable hazards. However, development that is so hazardous that it constitutes a significant risk to the public should not be allowed. You can also consider providing incentives for locating development away from hazardous coastal areas. Note that issues specifically related to shoreline structures are addressed in Section 9 of this LUP guide.

Hazard Components of LCPs should also be upgraded to address emerging issues related to adapting to climate change. Since this Guide was first published, government at all levels continues to address impacts from climate change pursuant to the requirements of AB 32, the Global Warming Solutions Act of 2006. Executive Order (EO) S-13-08 was issued on November 14, 2008. The EO called on state agencies to develop California's first strategy to identify and prepare for these expected climate impacts. In 2009, the California Department of Natural Resources published The California Climate Adaptation Strategy. The Adaptation Strategy includes consideration of hazards issues

The complete text of the California Coastal Act is available at the Coastal Commission's website, at: <http://www.coastal.ca.gov/coastact.pdf>. You'll find policies about coastal resources planning and management in Chapter 3.

The 2009 California Climate Adaptation Strategy can be found at: http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf

such as sea level rise and identifies that, in the coastal zone the Local Coastal Programs are a key mechanism to implement the state's Adaptation Strategy. A first step for any LUP update may be a vulnerability analysis.

Additional information on this Adaptation Strategy is available at:

- ❑ **2009 California Climate Adaptation Strategy**, Chapter 6, at:
http://www.climatechange.ca.gov/adaptation/documents/Statewide_Adaptation_Strategy_-_Chapter_6_-_Ocean_and_Coastal_Resources.pdf

And, for vulnerability assessments relevant to the LCP planning process, see the following two examples:

- ❑ **City of Santa Barbara Vulnerability Assessment** (2012), available at: <http://www.energy.ca.gov/2012publications/CEC-500-2012-039/CEC-500-2012-039.pdf>
- ❑ **City of Santa Cruz Climate Change Vulnerability Assessment** (2011), at:
<http://www.cityofsantacruz.com/Modules/ShowDocument.aspx?documentid=21198>

What should an updated Coastal Hazards section include?

Certified LCPs all contain hazard policies or components that identify areas subject to coastal hazards and regulate new development to minimize risks to life and property consistent with other policies of the Coastal Act. LCPs address, where applicable, hazards from wave and storm surge, flood, fire, landslide, earthquake and tsunami. An update to the certified LUP policies will likely focus on updating information on the location and extent of any coastal hazard areas and revising policies to reflect any new scientific information on current or anticipated conditions that may affect the extent and impacts of coastal hazards.

To update an LUP it is important to assess changed conditions, present new data or new information for applicable areas of risk, and present updated land use designations, policies and maps for the following, as applicable:

- ❑ Beach or bluff areas subject to seasonal or long-term erosion
- ❑ Bluff retreat and beach erosion rates that take into account projected sea level rise, especially for areas subject to high waves, such as those from storms, surges and seiches
- ❑ Coastal or riverine flood hazard areas
- ❑ Tsunami inundation runup areas
- ❑ Geologic hazards, like landslide areas and areas of bluff and cliff instabilities

- ❑ Expansive or highly corrosive soils
- ❑ Subsidence areas
- ❑ Fire hazard areas (based on changes in development patterns and the urban/wildlands interface, and projected changes due to climate change)
- ❑ Seismic hazard areas, including areas of potential liquefaction (based on any new earthquake fault information)

You should consider updated LUP policies that incorporate any new techniques for avoiding or minimizing risks and mitigating impacts. Some such examples of mitigation measures recently considered by the Commission are linked in this section (or the Shoreline Erosion Section 9) and include:

- ❑ Beach nourishment, sand supply and recreation impact fees for beaches vulnerable to wave damage and erosion.
- ❑ Restricting future armoring for new development.
- ❑ Limiting grading and vegetation clearance on steep slopes
- ❑ Developing updated definitions and policies to ensure that redevelopment or reconstruction of existing development conforms to newer LCP setback standards

Where can I read some examples of updated hazards policies?

The many examples linked in this report offer a variety of hazard policy examples. There are some additional examples noted below. As with any examples, geologic conditions along the shoreline vary, so please consult applicable Commission District staff for application to your LUP update.

For a comprehensive suite of hazard policies see the following excerpt from the City of Newport Beach LUP:

- ❑ **City of Newport Local Coastal Program Land Use Plan**, Section 2.8 Hazards and Protective Device, starting at p. 2-49, at:
http://www.newportbeachca.gov/PLN/LCP/Internet%20PDFs/CLUPPart%202_Land%20Use%20and%20Development.pdf

This is part of the complete LUP:

- ❑ **City of Newport Local Coastal Program Land Use Plan**, at:
<http://www.newportbeachca.gov/index.aspx?page=1317>

Some recent Commission LCP actions offer examples of the suggested modifications made to proposed LUP hazard policies. To review these Commission actions see:

- ❑ **Revised Findings On City of Solana Beach LCP Land Use Plan**, at: <http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

- ❑ **City Of Laguna Beach Local Coastal Program Major Amendment LGB-MAJ-1-10 (Land Use Element Update)**, at: <http://documents.coastal.ca.gov/reports/2011/12/W9c-12-2011.pdf>

The resulting modified text of the Laguna Beach LUP is:

- ❑ **Laguna Beach General Plan Land Use Element**, at: <http://documents.coastal.ca.gov/reports/2012/5/W13a-5-2012-a1.pdf>

The most recent City of Laguna Beach update of its flood ordinance is:

- ❑ **Major Amendment Request No. 1-13-A (Flood) (LGB-MAJ-1-13A) to the City of Laguna Beach Certified Local Coastal Program**, at: <http://documents.coastal.ca.gov/reports/2013/6/Th14a-6-2013.pdf>

◆ Information Sources

Significant information is available from the California Geologic Survey. At this site you can access new mapping information and research on a range of hazards:

- ❑ **Welcome to the California Geological Survey**, at: <http://www.conservation.ca.gov/CGS/Pages/Index.aspx>

General hazards information to assist local government in hazard planning is available from the California Emergency Management Agency's website:

- ❑ **My Hazards** website, at: <http://myhazards.calema.ca.gov>

Note that on the My Hazards page is a link to a new way to access hazard information from the California Geologic Survey (a collaborative web service called MyPlan) that was developed by the California Emergency Management Agency and the California Natural Resources Agency (CNRA):

- ❑ **Hazard Mitigation** website, at: <http://hazardmitigation.calema.ca.gov/myplan>

High-resolution coastal elevation data sets to support the production of maps for coastal management applications such as assessment of vulnerability from severe storms, sea-level rise and coastal erosion are available from the California Ocean Protection Council (OPC):

- ❑ **Coastal Mapping (Lidar) Data**, at: <http://www.opc.ca.gov/2012/03/coastal-mapping-lidar-data-available/>

Sea Level Rise information is available using NOAA Coastal Services Center's Sea Level Rise and Coastal Flooding Impacts Viewer found at:

- ❑ **Digital Coast** website, at: <http://www.csc.noaa.gov/digitalcoast/tools/slrviewer>

For Central Coast communities, including San Francisco Bay shorelines and baylands, and the Bay Area coast, from Half Moon Bay to Bodega Head,

online maps and tools to help understand, visualize, and anticipate vulnerabilities to sea level rise and storms can be found at:

- ❑ **Our Coast Our Future**, at: <http://data.prbo.org/apps/ocof/>

For North Coast communities, the following report contains an assessment of existing shoreline conditions and a qualitative assessment of vulnerability to sea level rise:

- ❑ **Humboldt Bay Shoreline Inventory, Mapping, and Sea Level Rise Vulnerability Assessment**, at:
<http://scc.ca.gov/webmaster/ftp/pdf/humboldt-bay-shoreline.pdf>

◆ Definitions

You should also consider updating applicable definitions in order to guide implementation of the LCP policies and ordinances. Some definitions are defined in regulations, (see box) such as coastal bluff (in section 13577(h)). Others may need to be added or updated to reflect emerging issues. Other definitions helpful when updating hazards policies could include, as applicable, beach, sea cliff, infill, and economic life of structure (usually recommended by the Commission to be at least 75 or 100 years unless otherwise specified and restricted for specific development proposals), and redevelopment, reconstruction or remodel.

For examples of some definitions see the following LCPs:

- ❑ **Laguna Beach General Plan Land Use Element**, Appendix - Glossary, page A-2, at:
<http://documents.coastal.ca.gov/reports/2012/5/W13a-5-2012-a1.pdf>
- ❑ **City of Malibu Local Implementation Plan**, Definitions section, at:
<http://qcode.us/codes/malibu-coastal/>
- ❑ **Revised Findings on City of Solana Beach LCP Land Use Plan**, particularly the definition of Redevelopment, Suggested Modification #144, pg. 56, at:
<http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

What are some issues to address in an update of hazards management?

◆ Land Divisions

LUP land division policies should ensure that land divisions will result in new parcels that can be developed consistent with the Coastal Act requirement that new development not require shoreline structures, such as assuring that new parcels can be developed with structures that will not require shoreline protection during a 75 or 100 year economic life. In general land divisions that will result in new parcels which have no site where future structures can be located outside of high hazard areas would not address the Coastal Act

The California Code of Regulations, Title 14, Division 5.5, Chapter 8, be found at:
<http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000>

requirement to minimize hazards. You should consider policies where each new parcel would have at least the minimum developable area, consistent with the zone district, outside of any high hazard area. A sample policy, such as one from the adopted suggested modifications of the Solana Beach LUP, could be:

- **Revised Findings on City of Solana Beach LCP Land Use Plan**, pg. 29, at: <http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

***Policy 4.10** Land divisions, including lot line adjustments, shall be prohibited unless all proposed parcels can be demonstrated to be safe from flooding, erosion, fire and geologic hazards and will provide a safe, legal, all-weather access road(s), which can be constructed consistent with all policies of the LCP.*

◆ **Siting Development to Avoid Hazards/Setbacks**

A critical element of every LCP is the designation of appropriate review and setback criteria for bluff, cliff, and beach level development. Siting criteria help to carry out Coastal Act requirements in Section 30253. You should consider LUP policies that avoid locating new development in hazardous areas where feasible. Where locating development to completely avoid hazardous areas is not feasible, policies should provide siting standards to minimize the exposure of new development to geologic, flood and fire hazards. These policies should include any additional exposure to flooding and erosion due to sea level rise.

Your LCP should require a setback that assures that the structure will be stable for its economic life without the need for shoreline protective devices that alter the natural landform. The Commission in recent actions has generally defined the economic life of a structure as 75 to 100 years. This lifespan could potentially vary, though, if the development included specific provisions for its removal from the hazard zone at the end of the specified economic life or when it became endangered. For development along coastal bluffs or cliffs, both slope stability and erosion should be part of the analysis.

The relative stability of a slope can be calculated quantitatively by a slope stability analysis, in which the forces tending to resist a potential landslide are divided by the forces tending to drive a potential landslide. The industry standard for a “stable” site is that this quotient, called a factor of safety, be at least 1.5 in the static condition, and 1.1 to 1.2 under seismic conditions. The factor of safety generally increases with distance from the bluff edge, so the point at which the factor of safety reaches 1.5 constitutes a minimum setback for existing conditions and without considering erosion.

Most coastal bluffs are steadily retreating due to erosion, impacts from storm waves and effects from sea level rise. In order to assure that the site will still

have a 1.5 factor of safety at the end of its economic life, the amount of bluff retreat expected over its life must be added to the initial setback.

Sea level rise should be incorporated into the erosion rate used in the factor of safety analysis. It is clear that future erosion rates are likely to be higher than historic rates; but, there is no fully accepted approach for estimating future bluff erosion with sea level rise. One approach used in the past has been to use the high range of historic erosion rates to represent future erosion rates. A more process-based method is to correlate future erosion rates with the increased frequency of wave impacts. This approach was used in the Pacific Institute study of sea level rise and is documented as part of their report:

- ❑ **The Impacts of Sea-Level Rise on the California Coast**, at: http://www.pacinst.org/reports/sea_level_rise

Your LCP should require a site analysis for bluff-top development to determine the present-day setback needed to minimize hazards. The factor of safety against sliding that is typically used to show that a development is stable is 1.5. To find the total setback needed, add to that figure the predicted bluff retreat for the expected life of the project, such as 100 years of bluff erosion. The Coastal Commission's staff geologist presented a memo on the topic to the Coastal Commission:

- ❑ **Establishing development setbacks from coastal bluffs**, at: <http://www.coastal.ca.gov/W-11.5-2mm3.pdf>.

For examples of LUP policies on bluff setbacks, see the suggested modifications to the City of Solana Beach LUP, the City of Laguna Beach LUP and from the San Luis Obispo County LUP for the Estero Area:

- ❑ **Laguna Beach General Plan Land Use Element**, beginning on p. 7-20, at: <http://documents.coastal.ca.gov/reports/2012/5/W13a-5-2012-a1.pdf>
- ❑ **San Luis Obispo County Local Coastal Program Major Amendment No. 2-04 (Part 2) Estero Area Plan**, at: <http://documents.coastal.ca.gov/reports/2008/7/Th16a-7-2008.pdf>
- ❑ **County of San Luis Obispo Estero Area Plan**, Ch. 7 Planning Area Standards, at: <http://www.slocounty.ca.gov/Assets/PL/Area+Plans/Estero+Area+Plan.pdf>
- ❑ **Revised Findings on City of Solana Beach LCP Land Use Plan**, suggested modifications on Hazards beginning on p. 22, at: <http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

The examples from the City of Solana Beach and the City of Laguna Beach include bluff setback policies that address sea level rise. For example this one from the City of Solana Beach:

***Policy 4.27:**...The predicted bluff retreat shall be evaluated considering not only historical bluff retreat data, but also*

acceleration of bluff retreat made possible by continued and accelerated sea level rise, future increase in storm or El Niño events, the presence of clean sands and their potential effect on the pattern of erosion at the site, and any known site-specific conditions...

It is also important to include setback policies that distinguish accessory structures, to allow their easy removal or relocation.

Additional guidance specific to evaluating sea level rise may be considered by the Commission in the near future.

◆ **Redevelopment, Reconstruction and Setbacks in Oceanfront and Blufftop Areas**

An LUP Update provides an opportunity to review current geological assessment requirements and setback standards, in the face of permit applications to reconstruct or replace homes and other primary structures on bluff and shorefront areas. Requirements for siting oceanfront or blufftop structures should account for our latest knowledge of the adverse impacts of shoreline armoring on coastal resources and the threats from projected sea level rise. Applying such new information to your jurisdiction could result in updating LCP policies to develop a strategy for addressing redevelopment of shorefront areas and achieve, for example, the gradual relocation of development to minimize risks to life and property and to avoid permanent armoring of the shoreline and the adverse shoreline impacts typically associated with such armoring.

If not addressed, cumulative additions, significant alterations and remodels, redevelopment and repair and maintenance of existing blufftop and shorefront homes and other existing structures can extend their economic life and perpetuate development in a location that over time is exposed to greater hazards. Such development increases the likelihood of eventual proposals for shoreline protection with the associated impacts to public access, recreation, sand supply, and other coastal resources.

Coastal Act policy 30253 requires, in part, that new development neither create nor contribute significantly to erosion or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. To address this requirement, you can update definitions and policies in your LUP to clarify when and how redevelopment or reconstruction activities in shorefront and blufftop areas must comply with LUP geologic stability and erosion control policies.

Because geologic conditions can vary along the coast, an LUP should take an area-wide approach to avoiding and minimizing risks that addresses the specific geophysical and development patterns of the area. In addition, LUPs should address the following:

- Define the coastal bluff and bluff edge that is used as the basis for

establishing the geologic setback line in the manner found in the California Code of Regulations 13577(h);

- Establish the geologic setback line based on the latest erosion rates, factor of safety, sea level rise projections and other pertinent information for the specific area;
- Define “nonconforming” to encompass structures that are located seaward of what would be the current geologic setback;
- Require a thorough alternatives analysis and site reassessment to prohibit or limit additions and improvements to nonconforming structures that perpetuate an inappropriate line of development in a hazardous location;
- Define a threshold for changes to existing structures that requires that an entire redevelopment/major remodel project conform with current setbacks;
- Indicate what level of repair/maintenance activities can be performed on nonconforming oceanfront or blufftop structures and under what conditions;
- Incorporate the best scientific information on sea level rise projections and adaptation planning; develop policies and standards to address an overall strategy to respond to lots that are located completely in hazardous areas, including potential options for acquisition, restrictions on building envelopes, and design standards for constrained lots, etc.

Although there may be existing, legally authorized shoreline protection present on sites with existing development, any existing shoreline protective device has its own design life and, depending on conditions, it may not be appropriate for the geologic analysis to assume the permanence of such structure when assessing erosion rate and appropriate setback calculations for proposed development.

More information about Coastal Act policies related specifically to Shoreline Structures is discussed in Section 9 of this Guide (Shoreline Erosion and Protective Structures) and should be reviewed when revising setback policies.

In establishing or revising setback policies, the LCP should also account for various scenarios where both existing protective structures currently exist and where they do not, and where it is feasible to remove older shoreline protective structures. While existing development may be eligible to be considered for protective structures, the LCP should ensure that an addition or remodel does not: (1) accelerate the need for a shoreline structure (e.g., the addition should not be further seaward than the existing structure); or (2) increase the likelihood of a future seawall beyond the existing development’s expected life (e.g., the existing structure is within the bluff top setback and nearing the end of its expected life and the addition is substantial and at the same location).

The Commission has been addressing these issues in recent updates. A recent action includes the approval with suggested modifications of the LUP for the City of Solana Beach:

- ❑ **Revised Findings on City of Solana Beach LCP Land Use Plan**, at: <http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

◆ **Sea Level Rise**

It is also critical that siting, setback and other new development policies for shoreline or flood hazard areas consider and factor in projected rise of sea levels. Planning for shoreline development needs to evaluate risks from flooding, wave uprush, coastal erosion, and extreme events such as tsunamis. When determining the extent of all of these risks, the analysis should factor in the best scientific estimates of projected sea level rise. The current best available science on sea level rise projections is the 2012 National Research Council report, described below. Sea level rise may increase risks of flooding and the rates of coastal erosion during large storms and high tides. You should consider policies in your LCP update that ensure that these evaluations are required and provide guidelines for siting new development.

For tsunami assessments, refer to the discussion later in this section (page 12) for examples of addressing sea level rise in estimating wave runup.

Sea level projections will also factor into coastal erosion rates and determination of applicable setbacks.

At a minimum, wave up-rush studies should consider the consequences of a low-probability wave event (such as the 1% annual probability, also known as the 1 in 100 year event) with the following beach and water conditions:

- Seasonally eroded beach with long-term erosion comparable to what could be expected to occur over the life of the proposed development;
- High tide, water surface increases due to El Niño, Pacific Decadal Oscillation, and such combined with the increase in mean sea level expected to occur over the life of the proposed development.

Development should be sited to avoid the zone of wave run-up.

The National Academy of Sciences published a study *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* that makes independent projections of sea-level rise along California's coast for the years 2030, 2050, and 2100, taking into account regional factors that affect sea level. Such projections should be taken into account when requiring site specific engineering and site analysis for development subject to sea level rise. The information in this report may be superseded in the future by newer reports. The current report is available at:

- ❑ **Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future**, at: http://www.nap.edu/catalog.php?record_id=13389

There are other resources available to consult. For example, researchers have published this Handbook to assist local governments:

- ❑ **Adapting to Sea Level Rise: A Guide for California's Coastal Communities**, at:
http://calost.org/pdf/announcements/Adapting%20to%20Sea%20Level%20Rise_N%20Russell_G%20Griggs_2012.pdf

The Ocean Protection Council adopted a resolution providing guidance to 16 state agencies that cooperated in development of the resolution. This guidance includes current estimates of projected sea level rise. LUP policies should assure that impact assessments include the best available science to guide setbacks and siting and design of development. The OPC information can be found here:

- ❑ **Memorandum: Update of the State of California Sea-Level Rise Guidance Document**, at:
http://www.opc.ca.gov/webmaster/ftp/pdf/docs/Memo_OPC_Council_2013meeting_FINAL.pdf
- ❑ **State Of California Sea-Level Rise Guidance Document**, March 2013 update, at:
http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf

The following are examples of some recent suggested modifications to LUP policies that reflect this approach:

- ❑ **Revised Findings on City of Solana Beach LCP Land Use Plan**, at:
<http://documents.coastal.ca.gov/reports/2012/6/Th24a-6-2012.pdf>

Policy 4.60: Siting and design of new shoreline development and bluff retention devices shall take into account predicted future changes in sea level. In particular, an acceleration of the historic rate of sea level rise shall be considered and based upon up-to-date scientific papers and studies, agency guidance... and reports by national and international groups such as the National Research Council and the Intergovernmental Panel on Climate Change. Consistent with all provisions of the LCP, new structures shall be set back a sufficient distance landward to eliminate or minimize, to the maximum extent feasible, hazards associated with anticipated sea level rise over the expected economic life of the structure.

- ❑ **Marina Del Rey Land Use Plan** A component of the Los Angeles County Local Coastal Program, at:
http://planning.lacounty.gov/assets/upl/data/pd_marina-del-rey-2012.pdf

7. New Development shall be sited and designed to ensure that it is not adversely affected by impacts from climate change,

including the potential impacts from continued and accelerated sea level rise over the expected design life of the new development.

8. Applications for coastal development permits for major development shall include a report prepared by a certified civil engineer describing the hazards to the area from continued and accelerated sea level rise. Siting and design of new major shoreline development anywhere in Marina del Rey Harbor and the siting and design of new or replacement shoreline protective devices shall take into account anticipated future changes in sea level, based on the best available scientific information and projections or range of projections of future sea level. Replacement of a structure refers to more than 50% of the cumulative repair and maintenance. Due to the uncertainties about future sea level rise, a range of likely and extreme rises in sea level shall be used in the planning and permitting of development to assess project sensitivity to future water levels, identify possible adverse consequences to the development and the surrounding area if the anticipated sea level is exceeded, and determine the minimum acceptable amount of future sea level rise that can be used for design purposes.

10. Los Angeles County should study the potential impacts of continued and accelerated sea level rise and flooding of water ways on the existing or proposed structures within all development zones, including impacts to development zones, traffic flow, public access, natural areas and water quality. The County should delineate low lying areas which may be inundated by tsunamis, floods or unusually high tides and/or may be damaged by excessive wave action, and changes to inundation and high damage areas due to continued and accelerated sea level rise.

11. Periodically review tsunami preparation and response policies/practices to reflect current and predicted future sea level trends, development conditions, and available tools and information for preparedness and response.

- **City of Dana Point Harbor Revitalization Plan & District Regulations Land Use Plan Component, at:**
<http://documents.coastal.ca.gov/reports/2010/10/W13a-10-2010.pdf>

8.6.5-1 Siting and design of new shoreline development anywhere in Dana Point Harbor and the siting and design of new or replacement shoreline protective devices shall take into account anticipated future changes in sea level, based on the best available scientific information and projections or range of projections of future sea level.

Planning for Tsunamis

Update hazards maps.

Avoid developing in hazardous areas.

Site critical facilities outside of the hazardous zone.

Keep policies current and based on the latest science.

If avoidance is not possible, develop plans for evacuation and examine options to elevate or floodproof key development elements.

8.6.5-2 Due to the uncertainties about future sea level rise, a range of likely and extreme rises in sea level shall be used in the planning phase to assess project sensitivity to future water levels, identify possible consequences to the development and the surrounding area if the anticipated sea level is exceeded, and determine the minimum acceptable amount of future sea level rise that can be used for design purposes.

8.6.5-3 OC Dana Point Harbor shall study the potential impacts of sea level rise and flooding of San Juan Creek on the existing or proposed structures along the seawall.

As additional information or guidance is available, the Coastal Commission will continue to make it available to local governments at the Commission's website:

- **Global Warming and Climate Change**, at:
<http://www.coastal.ca.gov/climate/climatechange.html>

◆ Tsunami Hazards

Historically, LCP policies have not always adequately addressed hazards caused by certain natural disasters. Updating your LCP is an opportunity to ensure that the full range of possible natural disasters that could occur are addressed using the latest available information. It is important to realize that during the last 20 years, much more information, inundation models and science has become available. In addition recent impacts to coastal areas from the tsunami off Japan underscore the importance of regulating new development in a manner that avoids and minimizes risks from such disasters. Sea level rise will exacerbate the impacts of a tsunami so it is important to incorporate sea level rise estimates into tsunami wave impact analysis.

An example of a recent action addressing tsunami run up hazards and sea level rise is in the suggested modifications adopted for the Humboldt County LCPA No.HUM-MAJ-1-08 (Samoa).

- **Humboldt County LCP Amendment No. HUM-MAJ-1-08 (Samoa)**, suggested modifications on pages 56, 62; 71; 87-92, at:
<http://documents.coastal.ca.gov/reports/2011/3/Th7a-3-2011.pdf>

These modifications for example, assure that any new residential lot has a building site where the first habitable floor can be located above the tsunami run-up zone, adequate evacuation plans and building standards for tsunamis, and key infrastructure is located so that it can remain operational as sea level rises.

Additional examples of tsunami hazard policies are provided below:

- **City of Crescent City LCP Amendment No. CRC-MAJ-1-03 (LCP Update)**, suggested modifications on pages 131-137 of Exhibit 1, at:
<http://documents.coastal.ca.gov/reports/2010/10/Th11a-10-2010.pdf>

- ❑ **Major Amendment Request No. 2-08 to the City of Redondo Beach Certified Local Coastal Program**, in particular suggested modifications on page 11 for hazards, at:
<http://documents.coastal.ca.gov/reports/2009/7/Th11a-7-2009.pdf>
- ❑ **The City of Newport Local Coastal Program Land Use Plan**, Section 2.8.2 beginning at p. 2-50, at:
http://www.newportbeachca.gov/PLN/LCP/Internet%20PDFs/CLUP_Part%202_Land%20Use%20and%20Development.pdf
- ❑ **The County of Del Norte LCP Amendment No. DNC-MAJ-2-03 (LCP Update)**, at:
<http://documents.coastal.ca.gov/reports/2009/10/W17b-10-2009.pdf>
- ❑ **The City of Crescent City LCP Amendment No. CRC-MAJ-1-09 (Costa Norte)**, at:
<http://documents.coastal.ca.gov/reports/2009/6/F4a-6-2009.pdf>

For examples of tsunami policies that include sea level rise see the City of Dana Point's LCP update:

- ❑ **Revised Findings for Major Amendment No. 1-10 (Dana Point Harbor Implementation Plan)**, especially suggested modifications on p. II-3.10, at:
<http://documents.coastal.ca.gov/reports/2011/4/W11a-4-2011-a1.pdf>

Tsunami inundation maps for evacuation planning have been published by CAL EMA at the following site:

- ❑ **Tsunami Inundation Map**, at:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Pages/Statewide_Maps.aspx

The National Weather Service has developed a Tsunami Ready program to help communities plan for a tsunami, many agencies are working to improve our ocean observing systems and provide better information on oceanic and weather conditions, and FEMA is updating the coastal flood maps.

◆ Fire Hazards

Where feasible, development should be sited to avoid areas of very high fire hazard in order to minimize risk to life and property. But where such siting cannot be avoided, you should consider policies that minimize risk through other techniques including managing vegetation to create defensible space around structures. But such vegetation management (sometimes referred to as fuel modification or brush management) if in or adjacent to significant native or environmentally sensitive habitat areas or public parklands can adversely impact and significantly degrade the qualities of those areas.

LCPs can be updated to guide how State defensible space requirements can be applied in a manner that remains consistent with the Coastal Act. Public Resources Code § 4291 mandates two different fire-safe zones for structures in

fire hazard areas: (1) a 30 ft. firebreak zone immediately adjacent to the structure where all flammable vegetation must be removed, and (2) an additional 70 ft. fuel reduction zone. An LUP update should develop policies to clarify how such vegetation management can be conducted to ensure environmentally sensitive habitat (ESHA) and other coastal resource protection can be addressed in: (1) new subdivisions, and (2) new development or redevelopment of existing structures on existing lots. LCPs can also address coastal permit requirements and agency coordination for fuel modification activities.

Updating your LCP offers the opportunity to ensure that fire prevention rules covering your jurisdiction are integrated into the LCP and that there is internal consistence among fire, ESHA and other related resource protection provisions. It is also an opportunity to address issues related to climate change and fire hazards. More information about this can be found in:

- ❑ **California Adaptation Strategy**, at: http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf
- ❑ **Cal-Adapt: Wildfire: Fire Risk Map**, at: <http://cal-adapt.org/fire/>

Subdivisions

Minimizing hazards can first be addressed in policies on subdivisions and lot line adjustments. To avoid future conflict with resource protection policies, consider the following policies:

- No new lot should be created on which a subsequent dwelling with its necessary fuel modification would be inconsistent with ESHA or scenic and visual resource policies; and,
- No new lot should be created on which a subsequent dwelling with its necessary fuel modification would result in fuel modification encroachment on adjacent public park, recreation or protected open space lands.

An example is in the City of Laguna Beach LUP:

- ❑ **Laguna Beach General Plan Land Use Element**, at: <http://documents.coastal.ca.gov/reports/2012/5/W13a-5-2012-a1.pdf>

***Action 10.6.3** No new division of land shall be allowed which would require new fuel modification (e.g. vegetation removal) or new fuel breaks in environmentally sensitive habitat areas or on public open space or park lands to protect new development within the resultant lots.*

Existing Lots

Risk and impacts from fire hazards can also be avoided or minimized through policies for siting new development on existing lots. It may be necessary to require design or siting modifications of a building in order for its defensible space zone to be accommodated consistent with ESHA and scenic resource policies.

An example of where this occurred is described in the staff report for:

- ❑ **Coastal Permit Appeal A-1-DNC-07-036 (Trask)** at <http://documents.coastal.ca.gov/reports/2008/10/F7c-10-2008.pdf>

You should consider a policy that ensures that any standards that apply to new structural development should generally apply to any required vegetation management for fire protection as well. For example, in permit review of proposed size and location, not only would the structural footprint be considered but the 100 foot fuel reduction zone around it would be considered as well. If an LCP's ESHA policies prohibit removal of certain vegetation that fuel reduction provisions dictate should be removed, then resizing or relocation of the structure should occur so the fuel reduction zone is modified to avoid the ESHA removal. Similarly, if a proposed expansion of an existing structure would result in a fuel reduction zone intruding into protected ESHA, the expansion would have to be scaled back, relocated and/or not approved. In cases where otherwise impermissible vegetation removal for fuel management purposes must be allowed to prevent a claim of unconstitutional takings of private property, some form of compensatory mitigation could be required. For example, the City of San Diego has a program to buy and place in open space additional land that serves as compensation.

For examples of LCP fuel modification policies see:

- ❑ **Laguna Beach General Plan Land Use Element**, policies 7.6 and 10.6 and associated Actions at pages 7-20 through 7-24, at: <http://documents.coastal.ca.gov/reports/2012/5/W13a-5-2012-a1.pdf>

The findings that the Commission adopted to support policies 7.6 and 10.6 are at:

- ❑ **City of Laguna Beach Amendment LGB-MAJ-1-10 Local Coastal Program – Land Use Element (LUE) Update/Land Use Changes**, at: <http://documents.coastal.ca.gov/reports/2011/12/W9c-12-2011.pdf>

Fire Hazard Management and ESHA

In evaluating fire prevention and potential impacts to ESHA, you should consider policies and implementation requirements that ensure that the evaluation identifies:

- ❑ What is the lateral and vertical extent of ESHA (i.e., is the canopy, or understory, or both affected by potential fuel modification or just certain

components ESHA?);

- ❑ Which, if any, ESHA species are considered flammable vegetation or combustible growth and under what circumstances;
- ❑ What typical fire reduction measures (e.g., limbing, thinning, understory clearance) can be undertaken without adversely impacting the ESHA; and,
- ❑ What non-combustible or non-flammable vegetation is compatible with the ESHA;
- ❑ What alternatives to ESHA vegetation removal may be available, such as modifying structural exteriors to be composed of non-flammable materials or adding sprinkler systems.

See, for example:

- ❑ **City of San Diego Municipal Code**, §142.0412, at:
<http://docs.sandiego.gov/municode/MuniCodeChapter14/Ch14Art02Division04.pdf>

Permit Conditions and Procedures and Agency Coordination

Updating fire hazard management provisions in your LCP is also an opportunity for various departments and agencies, such as the fire, planning and parks, to coordinate. While “100 feet clearance for fire safety” is a typical slogan found on signs, actual application of the fuel modification rules can be much more nuanced. Input and discussion by fire and biological experts could hopefully lead to preparing more specific vegetation management guidance tailored to the ESHA(s) in question, rather than a general 100 foot clearance recommendation. Especially if your community has sensitive vegetation and scenic open spaces, it would be helpful for the various departments to agree on and provide common detailed guidance on which species need to be removed in what locations, which just need trimming and where, and what vegetation can be maintained or planted and where. Your LCP can offer permit conditions for fuel modification such as erosion control, revegetation with fire-resistant species and siting of any equipment access and staging areas out of sensitive areas. The City of San Diego LCP contains an example of this approach:

- ❑ **City of San Diego Municipal Code**, §142.0412 regarding brush management, at:
<http://docs.sandiego.gov/municode/MuniCodeChapter14/Ch14Art02Division04.pdf>

Correspondingly, clarifying and coordinating review responsibilities can be helpful so that applicants are not given conflicting advice by planning and fire officials. The following LCP policy strives to achieve such coordination:

- ❑ **City of Malibu Land Use Plan**, page 71, at:
<http://malibucity.org/DocumentCenter/View/4422>

4.54 Should the County of Los Angeles Fire Department policies regarding fuel management and fire protection conflict with the policies and provisions of the Malibu LCP, particularly those relating to the protection of ESHA, personnel from the Fire Department and the City of Malibu shall meet and agree on measures to balance the need for fire protection for structures with the need to protect environmental resources.

It also may help to clarify how permit requirements apply to vegetation clearance for fuel reduction purposes. Please see:

- ❑ **Section 1 -- Local Coastal Permit Requirements** of Part II of this Update Guide, at:
http://www.coastal.ca.gov/la/lcpguide/lcp_ip_guide.pdf

◆ **Climate Adaptation**

The California Natural Resources Agency, in cooperation with other state agencies, boards, commissions and stakeholder groups, has prepared the 2009 California Climate Adaptation Strategy (CCAS); a 2013 update is in preparation. Since many coastal hazards will intensify with rising sea level and climate change, the recommendations in the CCAS can help plan for hazard avoidance and minimization for LCPs. Key strategies from the 2009 CCAS covered a state policy to avoid future hazards and protect critical habitat, guidance for protecting existing ecosystems, coastal development and future investments, preparation of sea-level rise and climate adaptation plans, support for regional and local planning to address sea-level rise impacts, a statewide sea-level rise vulnerability assessment, and support for essential data collection and information sharing. Details from the plan are at:

- ❑ **2009 California Climate Adaptation Strategy**, at:
<http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>
- ❑ **Coastal Conservancy Climate Ready Program**, at:
<http://scc.ca.gov/category/climate-change/>
- ❑ **Caltrans Project Development/PIDs Guidance**, at:
http://www.dot.ca.gov/ser/downloads/sealevel/guide_incorp_slr.pdf
- ❑ **Department of Water Resources (DWR) Integrated Regional Water Management (IRWM) Climate Change Document Clearing House**, at:
<http://www.water.ca.gov/climatechange/docs/IRWM-ClimateChangeClearinghouse.pdf>
- ❑ **Department of Water Resources 2009 California Water Plan Update**, at: <http://www.waterplan.water.ca.gov/>
- ❑ **Department of Water Resources Climate Change Website**, at:
<http://www.water.ca.gov/climatechange/>

◆ **Multi-Hazard Approach**

FEMA is now promoting an “all hazards approach” for hazards management. Rather than planning for each type of hazard separately, this approach looks at the whole environment, recognizes the positives and negative aspects of where to build, and then considers ways to mitigate for the various hazards. Community resilience is being emphasized. FEMA has published:

- **2010 State Hazard Mitigation Plan**, at:
http://hazardmitigation.calema.ca.gov/plan/state_multi-hazard_mitigation_plan_shmp